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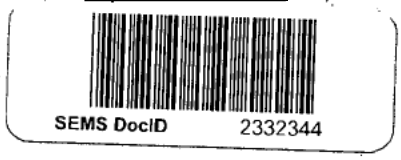

February 19, 2009

Mr. Greg Ham (3HS31)
On-Scene Coordinator
U.S. Environmental Science Center
701 Mapes Road
Fort Meade, MD 20755-5350

Subject: Draft Explosive Survey Work Plan - New Jersey Fireworks Site
EPA Contract No. EP-S3-05-02
Technical Direction Document No. E33-020-08-09-003
Document Tracking No. 0637

Dear Mr. Ham:

Tetra Tech EM Inc. (Tetra Tech) is submitting the final explosive survey work plan for the New Jersey Fireworks site located in Elkton, Cecil County, Maryland. Your comments (through email) dated February 3, 2009, have been address in the final work plan.

If you have any questions regarding this work plan, please contact me at "non responsive based on revised scope" "non responsive based on revised scope"

Sincerely,

"non responsive based on revised scope"

Project Manager

Enclosure

cc: TDD File

Method 8330B

Munitions components in soil,

Tetra Tech EM Inc.
7 Creek Parkway, Suite 700, Boothwyn, PA 19061
Tel 610.485.6410 Fax 610.485.8587 www.tetratech.com

EXPLOSIVE SURVEY WORK PLAN
FOR THE
NEW JERSEY FIREWORKS SITE
ELKTON, CECIL COUNTY, MARYLAND

Prepared for

U.S. Environmental Protection Agency Region 3
1650 Arch Street
Philadelphia, Pennsylvania 19103

Submitted by

Tetra Tech EM Inc.
7 Creek Parkway, Suite 700
Boothwyn, Pennsylvania 19061

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Prepared by

"non responsive based on revised scope"

Project Manager

Approved by

"non responsive based on revised scope"

START Point of Contact

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APPENDICES

1.0 INTRODUCTION

Under Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-05-02, Technical Direction Document (TDD) No. E33-020-08-09-003, U.S. Environmental Protection Agency (EPA) Region 3 tasked Tetra Tech EM Inc. (Tetra Tech) to conduct a site visit at the New Jersey Fireworks (NJF) site located in Elkton, Cecil County, Maryland. Tetra Tech was also tasked to prepare a munitions and explosives of concern (MEC) work plan for unexploded ordnance (UXO) surveys to be performed in eight munitions response site (MRS) areas in the eastern and central sections of the NJF site. The purpose of the site visit and MEC work plan is to identify the MRS areas and detail the UXO detector-aided surface survey procedures to be performed. If metallic items are detected in the subsurface, the UXO technicians will attempt to make a determination if it is MEC or of interest. If they determine it is MEC or of interest, the location will be recorded using a global positioning system (GPS) unit. It is the understanding of Tetra Tech NUS (TTNUS), that this is a MEC site and does not have an Explosive Safety Submission (ESS) therefore intrusive investigations of anomalies are not authorized. There is no plan to intrusively investigate any anomalies at this time.

Based on background information previously gathered for the western section of the site (also known as Route 7 Dump), no UXO survey is planned for this area at the present time.

Through an intercompany agreement between Tetra Tech and TTNUS, TTNUS will perform the survey at the NJF site.

Between December 3, 2007, and January 22, 2008, Tetra Tech collected field samples (soil, surface water and groundwater) in and around the site. Additional activities conducted on site as part of this sampling event included the construction of a grid and performance of a magnetic survey in limited areas. A trip report summarizing the sampling activities and a short report of the UXO survey conducted between December 3, 2007, and January 22, 2008, under TDD No. E23-014-07-10-002 was submitted to EPA in January 2008.

This work plan provides site background in Section 2.0, describes proposed site activities in Section 3.0, and describes a tentative work schedule in Section 4.0. All references and acronyms cited in this report are listed after the text.

2.0 BACKGROUND

This section describes the site location, presents a description of the site, discusses the MRS survey areas identified on site in 2007 and 2008, and summaries the MRS survey areas.

2.1 SITE LOCATION

The NJF site covers 61.4 acres and is located at 1726 E. Old Philadelphia Road in Elkton, Cecil County, Maryland. The site is situated in a rural area just north of Elk Neck State Forest and consists of three segments: eastern, central, and western portions of the site. The site is bordered to the north by E. Old Philadelphia Road/Route 7, to the east by an unnamed tributary of Mill Creek and a trailer park area, to the south by Amtrak Railroad and Mill Creek, and to the west by a septic cleaning agency. The geographic coordinates of the center of the site are approximately 39.6° N latitude and 75.87° W longitude (Maryland Department of the Environment [MDE] 2005). The site and surrounding area are shown on Figure 1, Site Location Map (U.S. Geological Survey [USGS] 1967) and Figure 2, Site Layout Map.

2.2 SITE DESCRIPTION

According to information found on the web site for Maryland Department of Assessment and Taxation, Cecil County, Real Property Data Search, the NJF site contains three parcels of land. Each parcel is identified and described below:

1. Map 32, Grid 4, Parcel P20 (26.30 acres): eastern section of the site, which contains the office trailer, Burn Pit Area 1 (BP 1), Disposal Area 1 (DA 1), Disposal Area 2 (DA 2), former sparkler building, tracer element area (TEA), and numerous large and small sheds
2. Map 32, Grid 4, Parcel P165 (32.07 acres): central section of the site, which contains Burn Pit Area 2 (BP 2) and numerous sheds and trailers
3. Map 32, Grid 4, Parcels P482 (3.02 acres): western section of the site, which contains the Route 7 dump area (Maryland Department of Assessment and Taxation 2007)

The site covers a total area of approximately 61.4 acres. The street address for the site is 1726 Old Philadelphia Road. The site is trapezoidal in shape and the northern border of the site runs parallel to Old Route 7 and is approximately 4,200 feet long, as shown on Figure 2, Site Layout Map.

The site lies approximately 25 to 75 feet above mean sea level (MSL) and gently slopes to the south towards Mill Creek. The western portion of the site (Route 7 Dump) consists of a former clay quarry filled with demolition and construction debris disposed of by the State Highway

FIGURE 1, SITE LOCATION MAP

Figure 2, Site Layout Map

Administration during the early 1980s. Prior to disposal of highway construction materials, the quarry received wastes from ordnance and fireworks manufacturing facilities. The eastern portion of the site contains several widely spaced warehouse buildings, including the former sparkler building. At the end of 2007, the sparkler building burned down and was partially demolished. The central portion of the site is wooded. The roads on the site are unimproved and the easternmost portion of the site is fenced and a locked gate restricts access. The Route 7 Dump area is also fenced but not locked. The Amtrak railroad tracks and Mill Creek provide a natural barrier to the site along the southern border. Elk Neck State Forest is located south of site on the southern side of the Amtrak Rail Line.

2.3 FIVE MRS AREAS IDENTIFIED IN OCTOBER 2007

In October 2007, EPA and Tetra Tech identified five MRS areas at the NJF site that require MEC investigations. This section describes the five MRS areas identified during site investigations conducting in October 2007.

2.3.1 Burn Pit Area 1

Burn Pit Area 1 (BP 1) is located north and northwest of the former sparkler building (in the eastern portion of the site). The area is approximately 270 feet long and parallel to Route 7. The northern boundary of BP 1 is approximately 175 feet south from the fence delineating the north boundary of the site. BP 1 covers 1.34 acres and is relatively flat and free of any visible metallic objects or debris.

2.3.2 Burn Pit Area 2

Burn Pit Area 2 (BP 2) is located in the central portion of the site. Waste material from the fireworks factory may have been burnt in this pit, which is currently 8 to 10 feet in diameter. The area surrounding BP 2 is not flat and contains visible metallic objects and debris. BP 2 covers approximately 0.23 acre.

2.3.3 Disposal Area 1

Disposal Area 1 (DA 1) is located east and southeast of the former sparkler building (in the eastern portion of the site). The area is relatively flat and contains metallic objects such as cast iron pipe, one small 8-foot by 8-foot tin shed, and junk materials. DA 1 covers approximately 0.19 acre.

2.3.4 Disposal Area 2

Disposal Area 2 (DA 2) is located at the southeast corner of the eastern part of the site in a low-lying wooded area. Water puddles and tall trees are visible throughout the area. DA 2 covers approximately 2.44 acres.

2.3.5 Tracer Element Area

Tracer Element Area (TEA) is located southeast of the office trailer in the eastern portion of the site. Logs of different lengths and diameters mark the northern and eastern boundaries of TEA. The area is not flat and contains visible metallic objects and debris such as electrical wire and junk material. A septic tank is suspected to be in TEA or around its general vicinity. TEA covers approximately 0.43 acre.

2.4 THREE ADDITIONAL MRS AREAS IDENTIFIED IN 2008

During site visits conducted in October 2007, Tetra Tech and EPA identified MRS areas BP 1, BP 2, DA 1, DA 2, and TEA at the NJF site. During the NJF site visit on November 6, 2008, three additional MRS areas were identified when Work Assignment Manager (WAM) Greg Ham (EPA) [redacted] Tetra Tech), and [redacted] TTNUS) met with the current site lessee, [redacted] After an initial discussion with the lessee, EPA, Tetra Tech, and TTNUS performed a site walkthrough and identified additional areas where UXO surveys will be performed. The three new MRS areas are located in the eastern (one) and central (two) sections of the site. No new areas were identified in the western section of the site (Route 7 Dump).

This section describes the three MRS areas identified during site investigations conducted in November 2008.

2.4.1 Eastern Section Southwest

During the November 2008 walkthrough, a vegetated area was observed along the southwest corner of the eastern portion of the site. The area under observation was not previously surveyed. EPA WAM Greg Ham requested that Tetra Tech and TTNUS perform an UXO survey in this area, identified as eastern section southwest (ES-SW). ES-SW is approximately 300 feet long and 150 feet wide and covers approximately 1.03 acres.

2.4.2 Central Section North and Central Section South

During the earlier UXO survey performed in October 2007, one 100-foot by 100-foot area (DA 2) was identified and surveyed by Tetra Tech subcontractor Enviroscan. However, during the site walkthrough conducted on November 6, 2008, EPA WAM requested that Tetra Tech and

TTNUS perform an UXO survey over the entire central area, except for the low lying area located in the southern area of the central portion.

An approach road (running west to east) divides the central portion of the site. The area to be surveyed on the north side of the road is identified as central section north (CS-N). CS-N is approximately 1200 feet long and 150 feet wide and covers approximately 4.12 acres.

The area to be surveyed to the south side of the road is identified as central section south (CS-S). CS-S is approximately 1200 feet long and 500 feet wide and covers approximately 13.8 acres. A low-lying area (marsh land) located along the southern boundary of the central section of the NJF site is not included in the survey area.

2.5 SUMMARY OF MRS SURVEY AREAS

Table 1 describes the locations within the site, survey locations, survey location identifiers, area covered in acres, and comments regarding the MRS survey areas within the NJF site.

TABLE 1
MRS SURVEY AREAS

LOCATION WITHIN SITE	SURVEY LOCATION	SURVEY LOCATION IDENTIFIER	AREA (in acres)	COMMENTS
Eastern section	Burn Pit Area 1	BP 1	1.34	North of sparkler building
Eastern section	Disposal Area 1	DA 1	0.19	Southeast of sparkler building
Eastern section	Disposal Area 2	DA 2	2.44	Southeast corner of the site
Eastern section	Tracer Element Area	TEA	0.43	Southeast of office trailer
Eastern section	Eastern Section Southwest	ES-SW	1.03	Southwest of east section
Central section	Burn Pit Area 2	BP 2	0.23	One 50-foot by 50-foot area
Central section	Central Section North	CS-N	4.12	North section of central area
Central section	Central Section South	CS-S	13.8	South section of central area

3.0 WORK TO BE PERFORMED

Based on the October 2007 and November 2008 site visits, WAM Greg Ham (EPA) and [redacted] TTNUS) discussed subsequent tasks to be performed at the NJF site. This section describes those tasks; including activities related to mobilization and site preparation; site clearing; construction of site grid; UXO and detector-aided surface surveys; and identification, storage, and disposal of UXO materials.

3.1 MOBILIZATION AND SITE PREPARATION

Tetra Tech and TTNUS will mobilize the UXO survey team to the NJF site and prepare the MRS survey areas for investigation. The initial personnel requirements are detailed in section 3.1.1. Based on the site requirements and schedule, the EPA WAM may adjust the authorized site personnel accordingly.

Following approval of this MEC work plan, Tetra Tech and TTNUS will begin mobilization to the site as per the agreed schedule. Mobilization may include, but is not limited to the following tasks:

- Traveling to the site by all personnel as appropriate
- Mobilizing all required subcontractors, equipment, and materials and supplies to the site
- Review and approval of the health and safety plan (HASP) by the senior UXO supervisor (SUXOS) prior to conducting a site-specific health and safety review meeting for field personnel
- Conducting an approximately 1-hour long site-specific health and safety review meeting with field personnel based on information provided in the HASP, and collecting signatures of meeting attendees
- Delineating work zones as required by the HASP

This section describes the tasks required to gather personnel, establish site boundaries, determine site accessibility and traffic control, and provide site security for this MEC site survey.

3.1.1 Personnel

This section describes the proposed Tetra Tech and TTNUS personnel to be involved with UXO survey support activities, including a project manager assigned from the Tetra Tech Boothwyn, Pennsylvania office; UXO project manager; senior UXO supervisor (SUXOS); UXO safety

officer and quality control (QC) manager; UXO team leader; and UXO technicians assigned from the TTNUS Stone Mountain, Georgia office. The project manager and UXO project manager will provide off-site support throughout the duration of the project. Other UXO site personnel listed above will provide full-time field support through the duration of the project.

All personnel will be required to comply with the medical, training, experience, and educational requirements specified in the HASP and U.S. Army Corp of Engineers (USACE) Data Item Description OE-025.02, Chapter 29 *Code of Federal Regulations* 1910.120 (USACE 2003).

3.1.1.1 Project Manager

The Tetra Tech project manager oversees all project activities, and manages the financial, schedule, and day-to-day technical issues associated with the overall project. The project manager will provide support off site throughout the duration of the project.

3.1.1.2 UXO Project Manager

The TTNUS UXO project manager will ensure all issues related to the UXO survey are addressed, including equipment, staffing, and administrative requirements. The UXO project manager will provide support off site throughout the duration of the project.

3.1.1.3 SUXOS

The SUXOS will direct daily implementation and enforcement of the requirements described in the MEC work plan as they apply to UXO survey support and safety during site activities. The SUXOS will be responsible for supervising the day-to-day UXO operations at the site, and will direct subcontractors and other personnel on UXO survey safety. The SUXOS will be responsible for all site documentation.

Other responsibilities of the SUXOS will include:

- Assisting in the review of site-specific MEC work plan
- Ensuring site activities are scheduled and executed with adequate personnel and equipment resources to perform the job safely with required quality and in a timely manner
- Ensuring adequate communication between field personnel and emergency response personnel
- Ensuring site personnel are trained in accordance with the HASP
- Ensuring all notifications are given prior to beginning work

- Ensuring required exclusion zones are established and maintained
- Implementing the approved UXO survey safety program in compliance with all federal, state, and local regulations
- Analyzing UXO and explosives operational risks, hazards, and safety requirements
- Enforcing personnel limits and safety exclusion zones for UXO survey operations
- Conducting safety inspections to ensure compliance with UXO safety standards and regulations
- Implementing QC requirements including QC inspections of all UXO-related work
- Directing and approving corrective actions to ensure that UXO-related work complies with contractual requirements

The SUXOS assigned will have a minimum of 10 years of Explosive Ordnance Disposal (EOD)/UXO experience including UXO clearance operations and supervision of personnel. The SUXOS will have the authority to stop site activities if an immediate dangerous or hazardous situation exists. Hazardous situations will be immediately reviewed with the UXO safety officer and reported to the UXO and Tetra Tech project managers. The SUXOS will meet the qualifications stated in Department of Defense Explosive Safety Board (DDESB) Technician and Personnel (TP) 18 (DD 2004) and be under the direct supervision of the UXO project manager.

3.1.1.4 UXO Safety Officer and Quality Control Manager

The UXO safety officer and QC manager shall be on site at all times during UXO-related work and has immediate stop work authority.

Other responsibilities of the UXO safety officer and QC manager include:

- Ensuring site personnel are trained in accordance with the HASP
- Ensuring adequate communication between field personnel and emergency response personnel
- Ensuring required exclusion zones are established and maintained
- Implementing the approved UXO safety program in compliance with all federal, state, and local regulations
- Analyzing UXO and explosives operational risks, hazards, and safety requirements
- Enforcing personnel limits and safety exclusion zones for UXO operations

- Conducting safety inspections to ensure compliance with MEC safety standards and regulations.
- Conducting QC inspections to ensure compliance with this work plan

The UXO safety officer and QC manager will have a minimum of 8 years of EOD/UXO experience in all phases of munitions response actions or range clearance activities, as appropriate for the contracted operations and applicable safety standards. The UXO safety officer and QC manager will meet the qualifications stated in DDESB TP 18 (DD 2004) and will be under the direct supervision of the UXO project manager.

3.1.1.5 UXO Team Leader (UXO Tech III)

The UXO team leader will have a minimum of 8 years of EOD/UXO experience including prior military EOD and/or commercial UXO experience in munitions response actions and/or range clearance activities. The UXO team leader may supervise up to 6 UXO technicians. The UXO team leader will conduct UXO activities as directed by the SUXOS. The UXO team leader will meet the qualifications stated in DDESB TP 18 (DD 2004 and be under the direct supervision of the SUXOS.

3.1.1.6 UXO Excort Technician

The UXO escort technician will be assigned UXO avoidance activities to ensure areas of intrusive operation, including the installation of survey stakes, are free of anomalies and UXO concerns. The UXO technician will escort all non-UXO personnel on site as needed to prevent accidental exposure to potential hazardous ordnance items. The UXO escort technician will meet the maximum qualifications of a UXO technician II as stated in DDESB TP 18 (DD 2004), and be under the supervision of the SUXOS and UXO project manager.

3.1.1.7 UXO Technicians (UXO Tech II or I)

UXO Tech II technicians will have prior military EOD experience or a minimum of 3 years experience in munitions response actions or range clearance activities. UXO Tech I technicians will be under the direction and supervision of an UXO-qualified person. UXO technicians (UXO Tech II or I) will conduct UXO activities as directed by the UXO team leader and the SUXOS.

UXO personnel will meet the qualifications of an UXO technician as stated in DDESB TP 18 (DD 2004) and be under the direct supervision of the UXO team leader.

3.1.2 Establishment of Site Boundaries

The boundaries of each MRS area will be established with preloaded grid coordinates marked by Tetra Tech or TTNUS; or surveyed by a land surveyor using a Global Position System (GPS) in accordance with Department of Defense Standard Operating Procedure (SOP) No. 005, "Global Positioning System" (included in Appendix A). Survey stakes (or equivalent markers) will be used to mark the corners of the site. Survey tape or flagging may be used as needed to delineate the boundary lines where heavy vegetation or distance between corner stakes impedes visual lines of sight between stakes.

Safety requirements mandate that an active exclusion zone be established and maintained before any MEC activities occur because of the potential of encountering live explosively configured or fuzed munitions. For this project, the exclusion zone will be established at 200 feet. If nonsite personnel or nonessential non-UXO personnel enter the exclusion zone, all MEC operations will cease until the exclusion zone is re-established.

Both routine and emergency response actions dictate the need for prevention of unauthorized site access and for the protection of vital records and equipment. All equipment will be secured in a designated location each day.

3.1.3 Site Security

Site security will be maintained to ensure that nonessential personnel do not access the exclusion zone during the UXO detector-aided surface survey or other UXO avoidance operations at the site. Barricades will be positioned on site access routes at a minimum of 200 feet from the edge of the site. Notification procedures will be posted on the barricades to ensure that nonessential personnel notify the team working in the area prior to entering the area during active operations. Barricades will be removed when operations stop for the day.

3.2 SITE CLEARING

Brush cutting and mowing of grass may be required at most locations to prepare each MRS area for the detector-aided surface surveys. The amount of brush cutting required will be site-specific and based on the conditions at the time the investigations are conducted. The removal of vegetation covering 1 inch or smaller in diameter will be permitted as needed.

Brush cutting and vegetation removal to support the detector-aided surface survey will be conducted to the degree necessary to allow the metal detector to get within a few inches of the ground surface. The magnetic detector is approximately 1 inch in diameter and is durable. Therefore, it is possible to poke the detector through brush and vegetation; as a result, less brush

cutting and vegetation removal is required. The all-metals detector has a detection head of approximately 8 inches and is more fragile than the magnetic detector. Therefore, brush and vegetation must be cleared to within a few inches of the ground surface.

The type of equipment and techniques to be used for site clearing activities include:

- Hand held brush cutters (string or blade) used to clear light vegetation and small grassy areas
- Mechanized lawn mowers used to mow larger grassy areas
- Chain saws used in heavier brush areas and to cut small trees up to 1 inch in diameter
- Tractor-mounted brush hogs used in larger areas and heavier brush areas
- Brush and vegetation cuttings will be left at the site of the area cleared. If this is impractical, a wood chipper will be utilized.

Brush cutting and vegetation clearance operations will be conducted by the UXO staff. If it is necessary to utilize subcontractors, a UXO escort technician will be provided during subcontracted brush and vegetation clearance activities.

3.3 CONSTRUCTION OF GRID

UXO detector-aided surface surveys will be performed in accordance with procedures documented in SOP-01 (in Appendix A) . The UXO survey team will establish a site grid/coordinate system in each MRS area using a labeled system of survey stakes. The grids will generally measure 100 feet by 100 feet but may be larger or smaller as site conditions dictate.

Each grid will be further divided into search lanes. Using rope or line, the UXO survey team will establish 5-foot wide parallel lanes across the grid to survey all accessible areas with 100-percent coverage.

Upon completion of each survey grid, the UXO team will move to the next available MRS area, create a grid, establish 5-foot survey lanes, and resume survey operations until all eight MRS areas have been surveyed.

3.4 UXO ESCORT AND DETECTOR-AIDED SURFACE SURVEYS

This section describes the survey instruments, UXO escort operations, UXO detector-aided survey operations, and quality control measures to be used during the NJF site UXO survey.

3.4.1 Survey Instruments

Procedures and instrumentation for UXO detector-aided surface surveys will be followed in accordance with SOP-01 (Appendix A). A magnetic locator such as the Schonstedt, GA-52Cx instrument, or equivalent and/or an all-metal detector such as the White's spectrum XLT or equivalent will be used for detector-aided surface survey operations. The detection depth of the instrument is limited by size and orientation of the target and soil characteristics of the work area. The locators provide an audio signal for response but do not store data. The magnetic locator does not need to be calibrated. Table 1 of Tetra Tech NUS SOP No. 01 (found in Appendix A) shows the calibration settings for the White's spectrum XLT all-metal detector.

To ensure each detector is operating properly, the operator turns on the instrument and slowly moves the locator towards metal. As the probe advances toward the target, the audio signal will increase. Failure to detect the object is reason to reject the instrument.

The detector will be checked daily before starting detector-aided surface survey activities and after any battery change. The normal daily check for detector-aided surface survey operations is the blanket test. To conduct the blanket test, an area near the work site and free of anomalies will be identified. The SUXOS or UXO QC manager will position several inert munitions or surrogate munitions items on the surface and cover the items with a tarpaulin or similar cover so the items are not visible to the UXO technician. Each UXO technician will conduct a detector-aided surface survey of the blanketed test area and locate the test items. The SUXOS or UXO QC manager will compare the results of the test to the actual placement of the items and make corrections as necessary. UXO technicians will also conduct random checks during daily operations.

The normal setting for the Schonstedt instrument is 2; setting the instrument to 3 or 4 will make it more sensitive, and setting the instrument to 1 will make it less sensitive. The instrument will not detect copper, brass, or aluminum munitions. The normal setting for the White's all-metal detector will vary according to site conditions.

3.4.2 UXO Escort Operations

All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with this work plan. Specific requirements regarding personnel, equipment, and procedures are outlined below:

1. If any complete munitions or ordnance-related material is encountered, the item will be avoided during the UXO survey phase of the project. UXO technicians will not attempt to

identify the type or condition of the ordnance. Its location will be reported to the UXO team leader. MEC avoidance procedures will be practiced at all times. Potential exposure to chemical warfare materiel (CWM) at the sites is not anticipated. In the event that hazardous, toxic, and radiologic waste (HTRW) is encountered on site, the work site will be evacuated until the UXO safety officer, with concurrence of the EPA WAM, identifies and implements appropriate protective measures.

2. The UXO escort technician will clearly mark any area with visible ordnance or MEC, and the area will be avoided. The visible ordnance or MEC will be noted on the field log sheets or in the field logbook. The UXO escort will report the MEC to the SUXOS and/or the UXO project manager.
3. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during regular UXO escort technician duties.
4. The UXO escort will conduct an UXO avoidance survey for any proposed survey stake location using a metal detector to check for possible ordnance or ordnance-related material. If an anomaly is encountered or if the UXO escort technician suspects the presence of MEC, the proposed stake location will be relocated to an area free of concerns or anomalies.

3.4.3 UXO Detector-Aided Survey

The objective of the UXO detector-aided surface survey is to locate suspected MEC, materials potentially presenting an explosive hazard (MPPEH), and munitions debris (MD) on the ground surface. If suspect MEC, MPPEH, or MD is encountered, its location will be recorded and/or marked using a tape measure, other grid coordinate location system, or a GPS in accordance with Tetra Tech NUS SOP No.05, "Global Positioning System" (found in Appendix A). The UXO team will attempt to determine the condition of the suspect MEC, MPPEH, or MD without moving or disturbing the item prior to proceeding with the UXO detector-aided surface survey. Each item will be marked with flagging tape, and assigned a unique number starting with the site/grid ID label followed by the item number (e.g., BP1-1-1). All available information about the item will be recorded in the log book, including location, identification, item number, and whether or not the item is suspect MEC or MPPEH. A digital photograph will be taken of each item. The UXO team will not move or otherwise disturb the item in an attempt to collect information. After all available information is recorded for a specific item, the UXO team will resume the detector-aided surface survey.

Additionally, there is a possibility that fireworks, bulk pyrotechnics, and other material associated with the manufacturing of fireworks will be encountered. There may be little or no metallic signature associated with this material so visual observation will be vital in locating and characterizing potentially contaminated areas. Areas containing suspect fireworks-related material would be marked, located, and recorded in the same manner proposed for MEC/MPPEH identification. The UXO team will not move or otherwise disturb any suspect material in an attempt to collect information. Historically, fireworks and related material were disposed of at the facility. Any suspect trenches, pits, or depressions that could be associated with disposal activities should also be marked, located, and recorded. All suspect fireworks material and areas potentially associated with disposal activities should be brought to the attention of the project manager to help guide the location of future sampling activities.

3.4.4 Quality Control

Under the direction of the EPA, Tetra Tech and TTNUS will provide a staff of experienced administrative and technical professionals to serve as key personnel responsible for implementing QC requirements associated with this project. These personnel will be selected for their management and technical abilities, and will include the project manager, UXO project manager, SUXOS, UXO safety officer and QC manager, and UXO technicians. Some individuals may be required to perform multiple functions at the site.

Table 2 summarizes the measurement performance criteria required for detector-aided survey activities.

TABLE 2
MEASUREMENT PERFORMANCE CRITERIA

Data Type	Data Quality Indicator	QC Sample and/or Activity to Assess Measurement Performance	Measurement Performance Criteria	Frequency
Grid	Precision	UXO detector-aided surface survey – direct comparison to field data	Detect 20mm and larger metallic items on surface	25% on first four grids, then 10% if all grids pass QC

Notes:
mm millimeter
QC Quality control
UXO Unexploded ordnance

QC checks will be conducted, as follows:

- Daily Briefings – The SUXOS will ensure that daily safety and operational briefings are conducted routinely.
- At a minimum, communication checks will be conducted each day prior to starting work. Additional checks will be performed as necessary throughout the workday to monitor progress, safety, and/or QC.
- Teams will not start operations until satisfactory checks have been achieved.
- Training – The UXO project manager will ensure that initial site-specific training is performed for all field personnel prior to startup of field activities, and that all safety control measures have been established. Training will be accomplished using only approved training materials. The SUXOS will ensure that all certifications are filed on site and are available for EPA inspection.
- Documentation – The SUXOS will ensure the completion of all documentation (as outlined in Table 3).
- Review – The SUXOS will be responsible for supervising all site activities including:
  - Supervision of Tetra Tech personnel and subcontractor staff
  - Compliance with this work plan and associated HASP
  - Adherence to the contract schedule
  - Review and submission of all daily and job status reports and documentation
  - Direct daily communication with the UXO project manager

All field activities affecting QC will be performed in accordance with documented procedures, instructions, or drawings identified in the work plan and applicable regulatory guidelines. During field activities, Tetra Tech will use daily equipment checklists, daily QC reports, QC summary reports, and field logbooks.

The SUXOS will maintain a field logbook of all inspection and testing activities. This logbook will be used daily in preparing the daily QC report. The QC reports will be submitted with the summary report. Reports will not be prepared on days on which no work is performed. At a minimum, one report will be submitted for every 7 days of no work and on the last day of a period of in activity. Daily reports will be signed and dated by the SUXOS. Summary reports will be signed by the UXO project manager.

The daily QC reports and the summary report shall include summaries of the following:

- Contractor and subcontractors and responsibilities
- Equipment used, with any idle or downtime noted
- Location, personnel, and description of work for each day
- Safety evaluations including a description of inspections, results, and any corrective actions

The QC documentation requirements associated with field activities in support of this project are defined in Table 3. These requirements apply to all field activities that affect the quality of work and work products.

TABLE 3
QC DOCUMENTATION REQUIREMENTS FOR UXO SUPPORT

Objective	Activity	Activity Quality Requirement	Quality Control Verification
Prepare site	Mobilization and site preparation	Mobilize equipment and personnel, and prepare site as described in this work plan.	▪ Daily site health and safety meeting report ▪ Field logbooks
Site work	UXO surface survey	UXO technicians, supervised by a UXO team leader, will complete a surface survey of the area of concern. QC checks will be performed to ensure objects approximately the size of a 20mm projectile or larger on the surface have been located, identified, and flagged. Fail criteria will be any object approximately the size of a 20mm projectile or larger or an MEC item not located in the area of concern.	▪ Daily QC report ▪ Daily site health and safety meeting report ▪ Daily equipment checklist ▪ QA audit checklist and audit form ▪ Health and safety compliance inspection ▪ Field logbooks ▪ QC 10% of area cleared during surface survey
Site work	UXO escort support	UXO technician will conduct anomaly avoidance while conducting UXO escort duties. QC checks will be performed to ensure no potential MEC items are moved or disturbed during this phase of the project. Fail criteria will be any anomaly moved or disturbed.	▪ Daily QC report ▪ Daily site health and safety meeting report ▪ Daily equipment checklist ▪ QA audit checklist and audit form ▪ Health and safety compliance inspection ▪ Field logbooks ▪ QC/observe UXO escort duties
Site work	UXO site preparation	UXO technicians will conduct anomaly avoidance and be supervised by a UXO team leader, during installation of grid corner stakes and markers as needed.	▪ Daily QC report ▪ QA audit checklist and audit form ▪ Health and safety compliance inspection ▪ Field logbooks
Site work	Demobilization	Demobilize equipment and personnel according to schedule.	▪ Daily site health and safety meeting report ▪ Health and safety compliance inspection ▪ Field logbooks

Notes:
MEC Munitions and explosives of concern
mm millimeter
QA Quality assurance
QC Quality control
UXO Unexploded ordnance

Field performance will be evaluated to ensure that the quality standards and objectives of this work plan are met. The evaluation will be accomplished through audits of the daily QC reports. Audits will be conducted and corrective actions will be implemented when nonconformances or deficiencies are identified. Additional audits may be conducted periodically. The audits will be planned and conducted by the UXO project manager or EPA WAM. Procedures for auditing activities will be identified prior to implementation of the audits.

The audit process will involve identifying nonconformances or deficiencies, reporting and documenting them, initiating corrective actions through appropriate channels, and following up with a compliance review. Records will be kept of all auditing tasks and findings on the quality assurance (QA) audit checklist and audit notes.

The field teams involved with all site work are responsible for reporting any suspected technical nonconformances or deficiencies to the SUXOS or UXO project manager. The UXO QC manager is responsible for evaluation of the situation and taking action, if any is required, after following the notification protocol.

3.4.5 Governing Regulations/Guidance and ESS

The work planned for the investigation at each site does not require an explosive safety submission (ESS) because MEC avoidance measures will be practiced during the investigation. No MEC or MPPEH will be moved or disturbed during this phase of the project.

All UXO detector-aided surveys and avoidance activities will be carried out in accordance with all local, state, and federal regulations, and will include general guidance from applicable USACE DID requirements, including Engineer Pamphlet EP-75-1-2 (USACE 2004b), Engineering Manual EM 1110-1-4009 (USACE 2007), and DID MR-001 (USACE 2003).

All activities involving work in areas potentially containing MEC hazards shall be conducted in full compliance with the Military Munitions Response Mandatory Center of Expertise (MM CX), Department of the Army, and Department of Defense requirements regarding personnel, equipment, and procedures.

Tetra Tech has developed SOPs for UXO operations. The SOPs to be followed on this project include SOP No. 01, "UXO Detector-Aided Surface Surveys," SOP No. 02, "MEC Management and Accountability," and SOP No. 05, "Global Positioning System" (TTNUS 2009a, 2009b, 2009c). All of the SOPs are included in Appendix A of this work plan.

3.5 IDENTIFICATION OF UXO MATERIALS

MEC management and accountability procedures are documented in Tetra Tech SOP No. 02, "MEC Management and Accountability" (TTNUS 2009b) (found in Appendix A). Every effort will be made to identify each suspect MEC or MPPEH item encountered. Under no circumstances will any suspect MEC be moved in an attempt to make a definitive identification. Munitions items will be visually examined for markings and other external features such as shape, size, and external fittings. If unknown military munitions are encountered, the EPA WAM and UXO project manager will be notified. Prior to any action being performed on an ordnance item, all fusing will be definitively identified if it is possible to safely do so without disturbing the ordnance item. This identification will consist of fuse type by function and condition (armed or unarmed) and the physical state and/or condition of the fuse, such as burned, broken, exposed/sheared parts, etc.

Suspect fireworks-related material will be addressed using the same identification techniques and notification procedures as MEC/MPPEH. Under no circumstances will any suspect material be moved in an attempt to make a definitive identification. Suspect fireworks-related material believed to present an immediate safety hazard will be reported to the EPA WAM and UXO project manager for further action.

Only UXO-qualified personnel will perform MEC identification procedures. As an exception, a UXO Tech I may assist in the performance of MEC identification procedures when under the supervision of a UXO Tech III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Tech III or higher. All suspect MEC items will be recorded following the requirements of this MEC work plan, the project site-specific HASP, applicable ordnance operations procedural safety guidelines, and industry-accepted safe work practices and procedures.

3.6 STORAGE OF MEC MATERIALS

No storage of MEC materials will occur during this phase of the investigation.

3.7 DISPOSAL OF MEC MATERIALS

The EPA WAM and UXO project manager will be notified if MEC or MPPEH is encountered at the site. EPA will be responsible for coordinating any emergency response actions for disposal of MEC or MPPEH that may be required with military EOD.

4.0 SCHEDULE

Table 4 describes the tentative schedule for the preparation of work plan, mobilization to the site, site clearing, construction of grid, and UXO survey start and completion..

TABLE 4
PROPOSED SCHEDULE

WORK TO BE PERFORMED	TENTATIVE SCHEDULE
TDD received from EPA	September 12, 2008
First site visit	October 6, 2008
Work plan outlines submitted by Tetra Tech to EPA	November 12, 2008
Comments received from EPA on work plan outlines	November 18, 2008
Tetra Tech incorporated the comments and sent to TTNUS	December 1, 2008
Draft work plan from TTNUS submitted to Tetra Tech	December 23, 2008
Final work plan from Tetra Tech to EPA	January 9, 2009
Mobilization to site	January 26, 2009
Site clearing	January 27, 2009
Construction of grid in different UXO survey areas	January 29, 2009
UXO survey start	February 2, 2009
UXO survey completed	February 20, 2009

Notes:
EPA U.S. Environmental Protection Agency
TDD Technical Direction Document
Tetra Tech Tetra Tech EM Inc.
TTNUS Tetra Tech NUS
UXO Unexploded ordnance

REFERENCES

Department of Defense Explosives Safety Board (DDESB). 2004. Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel, TP-18. December 20.

Maryland Department of Assessment and Taxation. Cecil County, Real Property Data Search. Accessed on December 2006

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Tetra Tech NUS. (TTNUS). 2009a. "UXO Detector Aided Surface Survey". Standard Operating Procedure (SOP) No. 01. January.

Tetra Tech NUS. (TTNUS). 2009b. "MEC Management and Accountability". SOP No. 02. January.

Tetra Tech NUS. (TTNUS). 2009c. "Global Positioning System". SOP No. 06. January.

U.S. Army Corp of Engineers (USACE). 2003. Type I Work Plan. Data Item Description (DID) MR-001. December 1.

USACE. 2004. Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities. Engineer Pamphlet EP-75-1-2. August 1.

USACE. 2007. Ordnance and Explosives Response. Engineering Manual, EM1110-1-4009. June 15.

US Department of Labor, Occupational Safety and Health Administration *Code of Federal Regulations.* Chapter 29, 1910.120.

U.S. Geological Survey (USGS). 1967.

ACRONYMS LIST

BP 1	Burn Pit Area 1
BP 2	Burn Pit Area 2
CS-N	Central section north
CS-S	Central section south
CWM	Chemical warfare materiel
DA 1	Disposal Area 1
DA 2	Disposal Area 2
DDESB	Department of Defense Explosives Safety Board
DID	Data item description
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ESS	Explosive safety submission
ES-SW	Eastern section southwest
GPS	Global Positioning System
HASP	Health and safety plan
HTRW	Hazardous, toxic, and radiological waste
MD	Munitions debris
MDE	Maryland Department of the Environment
MEC	Munitions and explosives of concern
MM CX	Military Munitions Response Mandatory Center of Expertise
MPPEH	Material potentially presenting an explosive hazard
MRS	Munitions response site
MSL	Mean sea level
NJF	New Jersey Fireworks
PM	Project manager
QA	Quality assurance
QC	Quality control
START	Superfund Technical Assessment and Response Team
SUXOS	Senior unexploded ordnance supervisor
TDD	Technical Direction Document
TEA	Tracer Element Area
Tetra Tech	Tetra Tech EMI Inc.
TTNUS	Tetra Tech NUS Inc.
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
UXO	Unexploded ordnance
WAM	Work Assignment Manager